General

Guideline Title

ACR Appropriateness Criteria® imaging of possible tuberculosis.

Bibliographic Source(s)

Ravenel JG, Chung JH, Ackman JB, de Grott PM, Johnson GB, Jokerst C, Maldonado F, McComb BL, Steiner RM, Mohammed TL, Expert Panel on Thoracic Imaging. ACR Appropriateness CriteriaÂ® imaging of possible tuberculosis. Reston (VA): American College of Radiology (ACR); 2016. 6 p. [22 references]

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Imaging of Possible Tuberculosis

Variant 1: Suspect active tuberculosis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☢
CT chest without IV contrast	7	This procedure is recommended if x-ray is equivocal.	☢☢☢
CT chest with IV contrast	6		☢☢☢
CT chest without and with IV contrast	3		☢☢☢
MRI chest without IV contrast	3		O
MRI chest without and with IV contrast	3		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Newly positive PPD or IGRA OR positive PPD or IGRA with unknown prior status. No clinical symptoms.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☢
CT chest with IV contrast	4		☢☢☢
CT chest without IV contrast	3		☢☢☢
MRI chest without IV contrast	2		O
MRI chest without and with IV contrast	2		O
CT chest without and with IV contrast	1		☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: PPD not available. Placement in group home or skilled nursing facility. No clinical symptoms.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☢
CT chest with IV contrast	2		☢☢☢
CT chest without IV contrast	2		☢☢☢
MRI chest without IV contrast	2		O
CT chest without and with IV contrast	1		☢☢☢
MRI chest without and with IV contrast	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Pulmonary tuberculosis (TB) predominantly results from the transmission of aerosolized mycobacterium TB to susceptible hosts. In the vast majority of cases, this results in subclinical disease with the immune system isolating the organism. In this setting, a person has latent TB and does not pose a risk to the community at large. The development of active infection within 1 year following exposure is termed primary TB and is classically described as a lobar pneumonia and/or mediastinal and hilar adenopathy. This pattern is most often seen in children and severely immunocompromised individuals. If active infection develops later than 1 year after initial exposure, it is considered to be reactivation TB, often presenting with apical posterior upper-lobe or superior-segment lower-lobe fibrocavitary disease and endobronchial spread through the airways.

With modern molecular techniques it has been shown that radiographic patterns of primary and reactivation TB overlap, and thus the preferred terminology for TB infection is active TB. The important public health issue is that both primary and reactivation TB present a risk of exposing the general population to TB infection.

A high level of suspicion should be maintained in immunocompromised hosts, particularly those with acquired immune deficiency syndrome (AIDS), as imaging manifestations may not fit a classic primary or reactivation pattern; instead, these patients may present with mediastinal lymphadenopathy alone or a deceptively normal chest radiograph.

Overview of Imaging Modalities

Chest Radiograph

The chest radiograph is usually the first study performed in patients suspected of having TB. Although frontal and lateral radiographs are often performed in this setting, it has been shown that the lateral radiograph does not improve the detection of findings related to TB. In those with signs or symptoms of disease, the radiographic pattern of upper-lobe or superior-segment lower-lobe fibrocavitary disease in the appropriate clinical setting is sufficient to warrant respiratory isolation and sputum culture for definitive diagnosis. Using radiographs in combination with clinical evaluation results in a high sensitivity for the diagnosis but a relatively low specificity for both latent and active TB. In addition, radiographs may reveal ancillary findings of TB such as pleural effusion or spondylitis. For immunocompromised hosts, particularly those with a low CD4 count, computed tomography (CT) should be considered.

Computed Tomography

The major advantage of CT is increasing the specificity of the diagnosis of TB; therefore, CT is often not necessary in the acute setting, particularly when the disease is already suspected and appropriate precautions and testing are already underway. CT may be able to better show distinct findings such as cavitation or endobronchial spread with tree-in-bud nodules and may be helpful in cases in which the chest radiograph does not show "classic" findings of TB. CT findings can also be helpful in predicting acid-fast bacilli smear positivity. Even in acid-fast bacilli smear–negative patients, CT may suggest the risk that a patient will be TB culture positive when findings consistent with active TB are present. CT may be of value in the severely immunocompromised patient with a normal or near-normal radiograph by revealing abnormal lymph nodes or subtle parenchymal disease. Finally, CT may also have a role in identifying patients with latent TB who will be at risk for reactivation disease.

Magnetic Resonance Imaging

Only 1 study has been performed evaluating magnetic resonance imaging (MRI) for suspected TB. In this study the accuracy of MRI was similar to CT in describing findings related to culture-positive patients. Inferential data regarding the value of MRI can also be derived from its role in cystic fibrosis and the observation in other settings that MRI correlates well with CT for parenchymal findings including bronchiectasis, cavitation, and tree-in-bud nodules. Although MRI is technically feasible and described in the literature, MRI has not been specifically evaluated as a primary imaging modality for patients with suspected or proven TB.

Nuclear Scintigraphy

Several nuclear radiopharmaceuticals have been employed for the purpose of evaluating possible TB, particularly for differentiating active from inactive tuberculomas and distinguishing tuberculomas from neoplasms. In small studies, Tc-99m methoxyisobutylisonitrile has shown higher activity over background in active tuberculomas compared with inactive tuberculomas. Similarly, metabolic activity measured by fluorine-18-2-fluoro-2-deoxy-D-glucose positron emission tomography (FDG-PET) is higher in active tuberculomas. Dual-time-point FDG-PET imaging (1 and 2 hours postinjection) can also help differentiate active tuberculomas from neoplasms, owing to the longer retention of FDG in benign lesions. Gallium 67 has been used to follow patients for disease activity and correlates with the number of organisms on sputum smears. Evidence for the use of nuclear imaging to diagnose active TB is limited to either small single-site studies or several small studies, and the impact on clinical practice and patient care at this time is minimal.

Discussion of the Imaging Modalities by Variant

Variant 1: Suspect Active Tuberculosis

The initial suspicion of active TB should be made based on clinical symptoms and demographics. Those at particular risk include those in close contact with patients having active TB, spending time in a TB-endemic country, or working/spending time in sites where TB is more prevalent, such as prisons, homeless shelters, and long-term care facilities. Those who are immunocompromised are at particular risk. Included in this category are also individuals with a newly positive purified protein derivative (PPD) skin test or a positive interferon-gamma release assay (IGRA) and who have symptoms that could be related to active TB. Clinical symptoms of active TB may include unexplained weight loss, night sweats, fever, prolonged cough, hemoptysis, and fatigue.

Chest Radiography

Identified individuals should undergo chest radiography as the initial test. Chest radiographs have been shown to have a high sensitivity for detecting manifestations of active TB. Chest radiography has a high sensitivity but relatively poor specificity owing to the overlap of findings with nontuberculous pulmonary infection. The yield of chest radiographs in high-risk patients ranges from 1% to 7%, although it is not clear how many of these cases would have been suspected based on clinical symptoms alone.

In particular, lobar pneumonia with associated hilar and/or mediastinal adenopathy or cavitary air space disease involving the apical posterior segments of the upper lobe or superior segment of the lower lobe should raise particular concern. When a chest radiograph confirms the clinical suspicion of active TB, it is sufficient to warrant respiratory isolation pending sputum cultures. However, in patients who are immunocompromised, particularly those with AIDS and very low CD4 counts, chest radiographs may be deceptively normal.

Computed Tomography

The role of CT remains less clear, but it should be considered for those with equivocal chest radiographic findings and may be efficacious in excluding active TB owing to its higher specificity. High-risk acid-fast bacilli smear–negative patients may also benefit from CT. AIDS patients with low CD4 counts and those taking anti–tumor necrosis factor medications have sufficient risk to warrant CT in the setting of high clinical suspicion for active TB and an unrevealing chest radiograph.

Magnetic Resonance Imaging

MRI is a reasonable consideration for use in select patients for whom there is a desire to avoid ionizing radiation.

Variant 2: Newly Positive PPD or IGRA OR Positive PPD or IGRA with Unknown Prior Status. No Clinical Symptoms

Chest Radiography

One key principle of PPD testing is application in those at high risk for developing latent TB infection. This may include those who work in settings where contact with active TB is possible and those coming from regions where TB is endemic. Although screening of low-risk individuals is discouraged, it is recommended for those whose future activity will place them at high risk for exposure or reactivation. The rationale behind performing chest radiography following a positive PPD is to distinguish latent TB from active TB, as these are managed differently. However, in patients without clinical symptoms the yield of radiographs for active TB (that would change management) is negligible. Furthermore, parenchymal findings of latent TB are relatively poor predictors of future reactivation. If a chest radiograph is performed, a frontal view is sufficient.

Computed Tomography

CT should be reserved for the rare case in which a chest radiograph may be equivocal for active TB and cases for which knowledge of latent TB abnormalities may inform future care, such as patients undergoing solid organ transplantation and biologic therapy for rheumatologic disease.

Magnetic Resonance Imaging

Like CT, there is a very limited role for MRI, although it may be considered when cross-sectional imaging is deemed necessary in a patient for whom there is a desire to avoid ionizing radiation.

Variant 3: PPD Not Available. Placement in Group Home or Skilled Nursing Facility. No Clinical Symptoms

Chest Radiography

Low-risk screening also frequently occurs in patients being transferred to correctional institutions, group homes, and skilled nursing facilities. Because of time constraints related to placing and interpreting a PPD, chest radiography has emerged as a surrogate measure. A meta-analysis of homeless populations suggests that using chest radiography as a screening measure is sufficient and can lead in some cases to a decline in the incidence of TB over time. This study, however, did not compare chest radiography screening to other screening strategies in terms of efficacy. Screening procedures vary from one prison site to another. There does not appear to be a large discrepancy in TB incidence regardless of screening technique (symptom survey, PPD, or chest radiograph). There is no evidence regarding the performance of routine radiography in low-risk patients who did not receive other TB screening before transfer to a group home or nursing facility.

Computed Tomography

CT should be reserved for the rare case in which a chest radiograph is equivocal for active TB and more definitive testing such as sputum culture is impractical.

Magnetic Resonance Imaging

Like CT, there is a very limited role for MRI, although it might be considered when cross-sectional imaging is deemed necessary in a patient for whom there is a desire to avoid ionizing radiation.

Summary of Recommendations

- Chest radiography is the first recommended test in patients with suspected TB.
- Chest radiography is generally appropriate for patients with new evidence of exposure or at high risk for development of TB, although it may be of low yield in patients who have no clinical symptoms.
- Chest CT is appropriate when TB is suspected and radiography is nonrevealing or nondiagnostic.

Abbreviations

- CT, computed tomography
- IGRA, interferon-gamma release assay
- IV, intravenous
- MRI, magnetic resonance imaging
- PPD, purified protein derivative

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢☢	0.1-1 mSv	0.03-0.3 mSv
☢☢☢	1-10 mSv	0.3-3 mSv
☢☢☢☢	10-30 mSv	3-10 mSv
☢☢☢☢☢	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Tuberculosis

Guideline Category

Diagnosis

Evaluation

Screening

Clinical Specialty

Family Practice

Infectious Diseases

Internal Medicine

Pulmonary Medicine

Radiology

Intended Users

Advanced Practice Nurses

Health Plans

Hospitals

Managed Care Organizations

Physician Assistants

Physicians

Public Health Departments

Respiratory Care Practitioners

Students

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of imaging procedures for diagnosing tuberculosis

Target Population

Individuals with suspected tuberculosis

Interventions and Practices Considered

1. X-ray, chest
2. Computed tomography, chest
    - Without intravenous (IV) contrast
    - With IV contrast
    - Without and with IV contrast
3. Magnetic resonance imaging (MRI), chest
    - Without IV contrast
    - Without and with IV contrast

Major Outcomes Considered

- Utility of imaging procedures in diagnosis and evaluation of tuberculosis
- Sensitivity, specificity, and accuracy of imaging procedures in the diagnosis and evaluation of tuberculosis

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Summary

A literature search was conducted in March 2015 and updated in May 2016 to identify evidence for the *ACR Appropriateness Criteria® Imaging of Possible Tuberculosis* topic. Using the search strategies described in the literature search companion (see the "Availability of Companion Documents" field), 420 articles were found. Eighteen articles were used in the topic. The remaining articles were not used due to either poor study design, the articles were not relevant or generalizable to the topic, or the results were unclear, misinterpreted, or biased.

The author added 4 citations from bibliographies, Web sites, or books that were not found in the literature search.

See also the American College of Radiology (ACR) Appropriateness Criteria® literature search process document (see the "Availability of Companion Documents" field) for further information.

Number of Source Documents

The literature search conducted in March 2015 and updated in May 2016 identified 18 articles that were used in the topic. The author added 4 citations from bibliographies, Web sites, or books that were not found in the literature search.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Definitions of Study Quality Categories

Category 1 - The study is well-designed and accounts for common biases.

Category 2 - The study is moderately well-designed and accounts for most common biases.

Category 3 - The study has important study design limitations.

Category 4 - The study or source is not useful as primary evidence. The article may not be a clinical study, the study design is invalid, or conclusions are based on expert consensus.

> The study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
>
> *Or*
>
> The study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
>
> *Or*
>
> The study is an expert opinion or consensus document.

Category M - Meta-analysis studies are not rated for study quality using the study element method because the method is designed to evaluate individual studies only. An "M" for the study quality will indicate that the study quality has not been evaluated for the meta-analysis study.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author assesses the literature then drafts or revises the narrative summarizing the evidence found in the literature. American College of Radiology (ACR) staff drafts an evidence table based on the analysis of the selected literature. These tables rate the study quality for each article included in the narrative.

The expert panel reviews the narrative, evidence table and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the variant table(s). Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The American College of Radiology (ACR) Appropriateness Criteria (AC) methodology is based on the RAND Appropriateness Method. The appropriateness ratings for each of the procedures or treatments included in the AC topics are determined using a modified Delphi method. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. The expert panel members review the evidence presented and assess the risks or harms of doing the procedure balanced with the benefits of performing the procedure. The direct or indirect costs of a procedure are not considered as a risk or harm when determining appropriateness. When the evidence for a specific topic and variant is uncertain or incomplete, expert opinion may supplement the available evidence or may be the sole source for assessing the appropriateness.

The appropriateness is represented on an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate" where the harms of doing the procedure outweigh the benefits; and 7, 8, or 9 are in the category "usually appropriate" where the benefits of doing a procedure outweigh the harms or risks. The middle category, designated "may be appropriate," is represented by 4, 5, or 6 on the scale. The middle category is when the risks and benefits are equivocal or unclear, the dispersion of the individual ratings from the group median rating is too large (i.e., disagreement), the evidence is contradictory or unclear, or there are special circumstances or subpopulations which could influence the risks or benefits that are embedded in the variant.

The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating. To determine the panel's recommendation, the rating category that contains the median group rating without disagreement is selected. This may be determined after either the first or second rating round. If there is disagreement after the second rating round, the recommendation is "May be appropriate."

This modified Delphi method enables each panelist to articulate his or her individual interpretations of the evidence or expert opinion without excessive influence from fellow panelists in a simple, standardized, and economical process. For additional information on the ratings process see the Rating Round Information document.

Additional methodology documents, including a more detailed explanation of the complete topic development process and all ACR AC topics can be found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current medical evidence literature and the application of the RAND/UCLA appropriateness method and expert panel consensus.

Summary of Evidence

Of the 22 references cited in the *ACR Appropriateness Criteria® Imaging of Possible Tuberculosis* document, all are categorized as diagnostic references, including 1 well-designed study, 10 good-quality studies, and 2 quality studies that may have design limitations. There are 8 references that may not be useful as primary evidence. There is 1 reference that is a meta-analysis study.

Although there are references that report on studies with design limitations, 11 well-designed or good-quality studies provide good evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate imaging modalities for diagnosis and evaluation of tuberculosis

Potential Harms

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Qualifying Statements

Qualifying Statements

- The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.
- ACR seeks and encourages collaboration with other organizations on the development of the ACR Appropriateness Criteria through society representation on expert panels. Participation by representatives from collaborating societies on the expert panel does not necessarily imply society endorsement of the final document.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Living with Illness

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Ravenel JG, Chung JH, Ackman JB, de Grott PM, Johnson GB, Jokerst C, Maldonado F, McComb BL, Steiner RM, Mohammed TL, Expert Panel on Thoracic Imaging. ACR Appropriateness CriteriaÂ® imaging of possible tuberculosis. Reston (VA): American College of Radiology (ACR); 2016. 6 p. [22 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Thoracic Imaging

Composition of Group That Authored the Guideline

Panel Members: James G. Ravenel, MD (*Principal Author and Panel Chair*); Jonathan H. Chung, MD (*Panel Vice-chair*); Jeanne B. Ackman, MD; Patricia M. de Groot, MD; Geoffrey B. Johnson, MD, PhD; Clinton Jokerst, MD; Fabien Maldonado, MD; Barbara L. McComb, MD; Robert M. Steiner, MD; Tan-Lucien H. Mohammed, MD (*Specialty Chair*)

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the American College of Radiology (ACR) Web site.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2015 Oct. 3 p. Available from the American College of Radiology (ACR) Web site.
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2015 Feb. 1 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Evidence table development. Reston (VA): American College of Radiology; 2015 Nov. 5 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Topic development process. Reston (VA): American College of Radiology; 2015 Nov. 2 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Rating round information. Reston (VA): American College of Radiology; 2015 Apr. 5 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2016. 4 p. Available from the ACR Web site.

- ACR Appropriateness Criteria®. Manual on contrast media. Reston (VA): American College of Radiology; 2016. 128 p. Available from the ACR Web site.
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2016 May. 2 p. Available from the ACR Web site.
- ACR Appropriateness Criteria® imaging of possible tuberculosis. Evidence table. Reston (VA): American College of Radiology; 2016. 11 p. Available from the ACR Web site.
- ACR Appropriateness Criteria® imaging of possible tuberculosis. Literature search. Reston (VA): American College of Radiology; 2016. 2 p. Available from the ACR Web site.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on January 10, 2017.

Copyright Statement

Disclaimer

NGC Disclaimer